Claims

[c1] A power supply system for an automotive vehicle comprising:
a first power source having a first positive terminal and a first negative terminal;
a second power source having a second positive terminal and a second negative terminal;
a common electrical node coupled to said first negative terminal and said second positive terminal;
a first load coupled between said first positive terminal and said common node; and
a DC-to-DC converter coupled to said first power source, said second power source and said common node.

[c2] A power supply system as recited in claim 1 further comprising a second load coupled to said common electrical node and said second negative terminal.

[c3] A power supply system as recited in claim 1 wherein said DC-to-DC converter is coupled to a first positive terminal, a second negative terminal and the common electrical node.

[c4] A power supply system as recited in claim 1 wherein the DC-to-DC converter comprises a bidirectional DC-to-DC converter.

[c5] A power supply system as recited in claim 1 wherein the converter comprises a unidirectional DC-to-DC converter.

[c6] A power supply system as recited in claim 5 wherein the unidirectional DC-to-DC converter comprises a switch coupled to the first positive terminal, an inductor coupled between the switch and the common node and a diode coupled between the switch and the second negative terminal, wherein said switch said diode and said inductor form a second common electrical node.

[c7] A power supply system as recited in claim 1 further comprising an inverter coupled to said first positive terminal and said second negative terminal.

[c8] A power supply system as recited in claim 7 further comprising an integrated motor generator coupled to said inverter.

[c9] An electrical system as recited in claim 1 wherein said common node comprises a chassis ground.

[c10] An automotive vehicle comprising:
a first power source having a first positive terminal and a first negative terminal;
a second power source having a second positive terminal and a second negative terminal;
a chassis ground coupled to said first negative terminal and said second positive terminal;
a first load coupled between said first positive terminal and said chassis ground;
a second load coupled between said chassis ground and said second negative terminal;
an inverter coupled to said first positive terminal and said second negative terminal;
an integrated motor generator coupled to said inverter; and
a DC-to-DC converter coupled said first power source and said second power source and said chassis ground.

[c11] An automotive vehicle as recited in claim 10 wherein said first power source comprises a 42 volt source.

[c12] An automotive vehicle as recited in claim 10 wherein said second power source comprises a 42 volt source.

[c13] An automotive vehicle as recited in claim 10 wherein said first power source has a first voltage rating and said second power source has a second voltage rating equal to said first voltage rating.

[c14] A power supply system as recited in claim 5 wherein DC-to-DC converter comprises a the unidirectional DC-to-DC converter having a switch coupled to the first positive terminal, an inductor coupled between the switch and the common node and a diode coupled between the switch and the second negative terminal, wherein said switch said diode and said inductor form a second common electrical node.

[c15] A method of operating an electrical system for an automotive vehicle

comprising:

operating a first load with a first power source;

operating a second load with a second power source;

forming a series combination of said first power source and said second power source; and

operating an inverter with said series combination;

coupling a DC-to-DC converter to the first power source and the second power source; and

transferring energy from the first power source to the second power source with the DC-to-DC converter.

[c16] A method as recited in claim 15 wherein transferring comprises transferring energy from the first power source to the second power source in response to a charge in the first power source and the second power source.

[c17] A method as recited in claim 16 wherein transferring energy from the first power source to the second power source comprises transferring energy from the first power source to the second power source through a unidirectional DC-to-DC converter.

[c18] A method as recited in claim 16 wherein comprises transferring energy from the first power source to the second power source through a unidirectional DC-to-DC converter comprises selectively electrically coupling an inductor and a diode to the second power source.

[c19] A method as recited in claim 15 further comprising transferring energy from the second power source to the first power source.

[c20] A method as recited in claim 15 further comprising forming a common node between said first power source, said second power source, said first load and said second load.